NEW BRUNSWICK FORESTRY PRACTICES

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NATURAL RESOURCES
NEW BRUNSWICK
RESSOURCES NATURELLES
NOUVEAU-BRUNSWICK

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FOREWORD

Describing forestry practices in New Brunswick means relating a complex story in understandable terms — a story in which the citizens, the forest industry and the environment sometimes cooperate but often clash in their struggle for healthy co-existence.

Forestry is the largest industry in New Brunswick and as such, forms a corner stone in our economy and creates thousands of jobs. It is therefore important that we all have a basic understanding of how the management of the forest resource is carried out and what implications it has for us and our environment.

For centuries the New Brunswick forest appeared to be an inexhaustable resource. Today, facing dwindling supplies of quality wood, we realize this was a serious misconception. Only active and well planned forest management will maintain our valuable resource.

Most people agree on the need for good management. It is only when we discuss the methods used, that disagreement and controversy result over what good management is and what methods are appropriate.

The first step toward a resolution of this debate is a compilation and presentation of basic information. This booklet is a step in that direction.

The Canadian Forestry Association of N.B. Inc. (C.F.A.N.B.) — a non-political group of individuals who share an interest in sound resource management — wants to create a greater public awareness and understanding of forestry. The C.F.A.N.B. hopes this publication will serve as an information source for those interested in all aspects of our forest resource.

Please read *New Brunswick Forestry Practices*. Then consider your future and the future of New Brunswick.

ACKNOWLEDGEMENTS

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Society, Forestry and Man

Society, Forestry and Man

laws and regulations

A complex relationship exists between man, society and the forest resource. The attitudes and expectations of men and women shape society's principles and priorities; society determines the laws and regulations which surround forestry. It is within these limits that the management work is done.

awareness

But to change forestry practices, legislation must sometimes be changed. And to first alter society's attitudes, an improved awareness of the state of our forest resource must be created.

complete picture

Technology, the environment, history and the economy are the important factors linked together to give the whole picture.

understanding

To understand the current state of the forest resource and its implications for our future, we must first understand how the interrelationship existed in the past.

early attitudes

Attitudes of early settlers were basically indifferent or negative to the forest. Trees were an intrusion on farmland so they were cut down. When wood was harvested for raw export to Europe, there was still no conception of the requirement for management of the wood source because the supply was greater than the demand.

demand greater

Today, the demand for quality wood is greater than the supply because concrete, long-term management has been insufficiently exercised on the forest. Management is really just beginning now.

economy, technology attitudes

In the short-term, changes are based on the economy and economic conditions can change quickly. Changes in technology occur over an average, or middleterm time span. Society's attitudes are the most difficult to change and therefore take the longest time. Subsequent management legislation to reflect those attitudes must also consider the economy and technology.

shortage

We have gone from an abundance to a shortage of wood. This has forced forest managers from the single use of timber from one stand (pulp concept) to maximum use of each individual tree (veneer, sawlogs, pulp, etc. . . .).

multiple-use

With management we can benefit from intensive multiple-use of the forest resource. With approximately 85 percent of New Brunswick covered by forest, it makes sense that this resource be used to its potential. This multiple-use includes protection of wildlife, watershed protection and improved access to recreation areas.

SOCIETY, FORESTRY AND MAN
Recommended Reading

Hosie, R.C., *Native Trees of Canada*, Fitzhenry and Whiteside Ltd. in co-operation with the Canadian Forestry Service, Don Mills: 1979.

Sargent, Charles Sprague, *Manual of The Trees of North America, Volumes I and II*, Dover Publications Inc., New York: 1965.

Report of the Forest Resources Study 1974, Fredericton: 1974.

Historical Background

Historical Background

300 year history

For more than 300 years the forest of New Brunswick has yielded to the axe. Its development as a resource has been a mirror of our economic history and, in some aspects, a reflection of our cultural values.

early settlers

From the beginning the forest has supported the people of the province in many ways. Early trappers, traders and settlers depended on the forest for survival. Forest land was cleared for settlements, and timber was used for building material and fuel.

fur trade

The existence of many fur-bearing animals in the forest sparked an interest in what became a profitable trade with fashionable Europe. Animals were also a source of food.

tall masts

The first industrial use of the forest came late in the 17th century when the area became famous for its large white pine, used for masts and spars on first the French and later, British ships. Consistent exploitation of only the largest and best of the species, a damaging practice known as selective cutting, but more properly termed highgrading, almost led to the disappearance of large white pine from these forests. Highgrading for quality lumber proved even more damaging.

highgrading

golden age

With the shipbuilding boom late in the 18th century came a golden age in New Brunswick history. All timber needed was found locally.

first sawmill 1696

Although the first sawmill appeared as early as 1696 on the Nashwaak River, it was another hundred years before a sizeable lumber industry developed.

sawmills flourish

By 1850 there were more than 600 sawmills flourishing in the province and lumber was a common cargo of locally-built vessels plying the water to European markets.

pulp and paper

Four small paper mills were built from 1826-1875, followed by the introduction of the modern chemical-pulp industry. One of these small mills is still in existence. It was built by Saint John Sulphite and is now integrated with the Irving Pulpmill near the mouth of the Saint John River.

sawmills reduced

The pulp and paper industry quickly predominated over the lumber industry early in the 20th century in the consumption of wood and value of the product. The biggest decline in lumbering occurred after World War I with the loss of overseas markets. Major commercial sawmills producing more than 200 cunits of wood per day (100,000 board feet) have now declined in number to fewer than 140 while the number and output of pulp and paper mills have risen.

small trees

The pulp and paper industry can use smaller trees than sawmills because the tree is chipped and cooked in the process of producing chemical pulp or ground to produce mechanical pulp (newsprint).

"pulp" concept

Crown Lands were licenced to the industry and the result was that many large trees suitable for sawlogs were shipped to the chippers. This practice of only one use for a tree, became known as the "pulp" concept and was not damaging in the short-term because wood was plentiful and profit reasonable. However, in the long-term, as sawlogs started to become scarce, it became obvious that the most appropriate end-use had not been considered. In the past, the forest has also been damaged by several "enemies", not only highgraded by man. Fire, wind and insects are nature's harvesters and have lead to even-aged stands in this part of the world.

forest fire

Forest fire is probably the most deadly and destructive force in nature's forest management system. It is capable of causing indiscriminate destruction of vast areas and all vegetation and wildlife are affected.

Miramichi Fire

There have been several unusually large fires in New Brunswick one of which was "the Miramichi Fire" in 1825. Virtually every major section of forest has undergone the trauma of a fire at least once in recent centuries.

cleans up

Forest fire provides a natural "clean-up" force particularly in over-aged and dying forest stands.

insects disease

Insects and disease are also part of our forest history and nature's forest management system. The "pests" and decay help break down the over-aged forest stand or eliminate the weak and suppressed trees.

reduce effects

In a managed forest, insects and disease pose a threat to production. However, since man introduced management to the forest, he has tried to reduce the impact of fire, insects and disease and has achieved some success.

change

The history of forest land in New Brunswick is a story of the relationship between man and his environment where a variety of influences and events create continuous evolutionary and economic change.

shortage predicted

The health of our forest and the productivity of the resource gains more importance as we become increasingly dependent on it and as we intensify our exploitation of it.

HISTORICAL BACKGROUND
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Fensom, K.G., *Expanding Forestry Horizons: A History of The Canadian Institute of Forestry (1908-1969)*, Canadian Institute of Forestry, Quebec: 1972.

MacKay, Donald, *The Lumberjacks*, McGraw-Hill Ryerson Ltd. Toronto: 1978.

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The Cyclical Life of the Forest and the Forest Stand

The Cyclical Life of the Forest and the Forest Stand

a tree

A tree is the largest form of plant life which goes through four stages of growth: (1) an initial period of seedling and sapling development, (2) a middle period, (3) the period of maturity, and (4) the period of decline.

maturity

The time when a tree becomes mature depends on the species. For example, poplar and fir are shortlived species while eastern hemlock and eastern white pine are long-lived species.

decay

As the tree passes maturity its growth slows and it becomes a prime target for insects, disease and wind damage. The tree ultimately dies and falls. The space provided by the fallen tree is later occupied by young seedlings and the cycle is repeated.

speed the process

Man has learned to imitate nature's management and with certain treatments he can speed up the growth of the tree, thereby shortening the time from its birth until it is large enough to be harvested.

stand

A "stand" is a group of trees similar enough in species, age and condition to distinguish it from nearby vegetation. Many differing in age and species composition, make up the forest itself.

unit management

An even-aged stand (or group of trees) — follows the same lifecycle as an individual tree. Therefore, an even-aged stand can be treated as a unit during all forest management activities: planting, thinning or clearcutting.

establishing dominance

The trees that develop faster establish dominance in the crown cover. Subsequently, the weaker trees die off or become suppressed from lack of light and the strongest flourish.

An even-aged stand where most of the trees are about the same size in diameter.

even-aged stand

clearcut

The theory of dominance in a stand is evident in the development of even-aged stands, where trees are all about the same age, but some will be taller or dominant over the rest. Trees grow this way after a 'clearcut harvest', which cuts down a whole stand, or after a 'natural clearcut' such as a forest fire, severe windstorm or insect attack.

amount of light

The development pattern of an even-aged stand is distinctive: dominant trees (the tallest) get most of the light, co-dominant trees get part of the light, intermediates grow in the shadow of the others and suppressed trees die off in a maturing forest. An even-aged stand is the easiest to manage and harvest. It is natural in our species mixtures in New Brunswick.

uneven-aged stand

An uneven-aged stand has trees of all ages and heights and is more difficult to harvest. Because mature trees are usually harvested first, and may be scattered throughout the stand, increased labour and transportation costs make it an expensive operation. It lends itself well to small woodlot operations because it provides continuous economic return and access is available. The uneven-aged stand maintains continuous forest cover and provides a continuous flow of benefits. An uneven-aged stand is not natural for many New Brunswick species, and requires intensive management.

expensive

farmer gets quick return

trees are slower crop

The agricultural farmer usually works on a one-year rotation, or lifecycle, with his crops. He can therefore count on a rapid turn-over of his crop and regular economic return. The forest stand manager has to be more patient, sometimes waiting several decades before he can harvest a tree or a stand.

cyclical harvesting system

A balanced managed forest might contain 60 different even-aged stands of equal size. The first is one year old, the next is two years and so on, the sixtieth stand is 60 years old. Then, if the economical lifetime of the trees in a stand is 60 years, the owner could harvest one 60 year-old stand each year. This system is the ideal solution for providing an even supply of wood into the future, as long as each harvested area is immediately reforested.

see headings

The different aspects of artificial regeneration (reforestation), thinning and harvesting are more fully described under their respective headings.

THE CYCLICAL LIFE OF A FOREST AND THE FOREST STAND

Recommended Reading

Kozlowski, T.T., *Growth and Development of Trees,* Volumes I and II, Academic Press, New York: 1971.

Leaflets are available from Natural Resources, Forest Extension Branch, R.R. #5, Fredericton, N.B.

Creating a New Forest

Silviculture

definition

'Silviculture' is any deliberate action to establish and actively manage a forest stand.

tree, stand, forest

'Silvi' means forest. 'Silvics' is the forest science dealing with the development of trees which make up the stand and the many stands which are the forest.

manipulation of nature

increase productivity

Forest managers manipulate nature to produce what can be best utilized by man. This is done by controlling the species composition and density of the stand: cleaning, thinning, controlling undesirable species, harvesting, and determining the rotation period. Restocking unproductive areas, protection of stands and utilization of wood to reduce waste are done to increase productivity.

economics

Biological factors determine the need for silviculture, but economic and administrative factors decide the extent to which silvicultural activities will be carried out in a specific area. The technology available is also a determining factor.

Natural & Artificial Regeneration

natural or artificial

Basically, new forest stands can be created in two ways — naturally or with minimal interference from man; or artificially, either by seeding or planting seedlings and carefully tending their development.

natural stands and competition

Naturally regenerated stands may produce extreme numbers of seedlings, resulting in intense competition for survival. Competition results in slow growth, and a large number of trees must die to let one tree reach large dimensions.

natural advantages new stand

Natural regeneration has certain advantages. The native species are well suited to their environment. Seedlings initially growing close together usually develop good stem form producing a quality stand. Regrowth is achieved at little or no cost.

shade tolerance

Some trees can grow under shade while others cannot. Shade tolerant trees include balsam fir, hemlock, spruce, white cedar, sugar maple, and beech.

pioneer trees

Species which can grow in the shade but prefer light are: yellow birch, white pine, and ash. Shade intolerant trees include grey birch, pin cherry, and poplar. These are known as 'pioneer trees' and they allow other species to get established beneath them before they, the shade intolerant trees, become suppressed.

natural sequence

After a clearcut, hardwoods usually invade the area first and softwoods follow, establishing themselves slowly below the shade intolerant hardwood. Softwood development is slower under these circumstances but hardwood yields to the softwood after 20-30 years.

reason for management

Silviculture is practiced so the stand will produce what the forest manager wants by giving each tree the most favorable conditions possible to maintain rapid volume growth and quality development.

artificial stands

Artificial stands are produced by man seeding an area with tree seed or planting small trees raised in nurseries.

seeding expensive

Seeding the area is an old, established method of reforestation, however, it is rarely used because there must be an abundance of seed available. This kind of operation is expensive and does not always work.

tree species selection

The first step in artificially creating a new forest stand is to prepare the site, and then choose the most suitable tree species for the ground or a species well-adapted to the local conditions.

competition

site preparation

The heavier the ground vegetation is, the more competition there is for nutrients and light between the seedlings and other vegetation, therefore, the need for site preparation is greater. Careful site preparation removes most of the competing vegetation and allows seedlings to establish themselves.

Site Preparation

remove competition

Undesirable ground vegetation and leftovers from a logging operation are competition for new seedlings. The stronger this vegetation, the greater the requirement for site preparation.

system

There are many ways to prepare the ground. Each of them removes competing vegetation and creates suitable conditions for planting the seed or seedling by exposing the soil.

expose soil

A few of these methods are quite common. Patch scarification is done with a tool or machine which scrapes the ground to expose bare patches of soil. Homogeneous or row scarification is done with an implement which is dragged along the ground and churns up the soil or chops up competing vegetation. Land clearing machines plow and fold over sections of ground in the terrace method of site preparation. Fire is used in limited controlled ways to eliminate all vegetation which may compete with the new seedling to be planted after the fire.

Choice of Species for Planting

site quality

The choice of species to be planted depends largely on the site quality: a suitable combination of soil, climate, light and precipitation that produces trees of highest economic value. A low site quality means longer growing time for lower volume. Different species perform differently on different sites.

pure, even-aged

One species planted in a specific area makes it a 'pure' or monoculture stand. An even-aged stand is when all trees are the same age.

long fibres

Softwood species are predominantly used in New Brunswick planting programs. Their long fibres are in good demand and can be utilized for more forest products thereby earning a high net return. Hardwoods have shorter fibres.

native trees

The species native or easily adaptable to a specific area, should be planted.

introducing species

Introduction of a species to an area is sometimes a success, if growing conditions are the same as the species' native environment. After surviving more than 100 years the adapted species is considered native. It is important that the seed, not the plant, be introduced to minimize the danger of bringing in disease on the plant tissue.

The Seedlings

'seed trees'

Forest planting stock should preferably be obtained from seed collected from superior natural stands and grown under carefully supervised nursery conditions.

resembles horticulture

The care of seedlings in the nursery closely resembles horticulture. Growing conditions are strictly controlled.

growing time

acclimatization

Bareroot seedlings are grown outdoors for 3-4 years before being out-planted. Container seedlings are grown in a variety of containers in greenhouses and then after an outdoor acclimatization period are planted in the forest. It normally takes about six to eight months from seeding before container seedlings are ready to be planted.

quality

Bareroot nursery stock is graded according to size and root development, before shipped to the field for planting.

Planting

methods vary

Early spring is usually the best time to plant seedlings because the roots grow quickly and hold the seedling in place, preventing frost heaving. The roots of a seedling are "shocked" during planting and this trauma can temporarily stop growth.

container seedlings

The container seedlings are sent to the field with the original (peat) soil still attached after they have been hardened for planting. This stock is used primarily in site-prepared areas where there is little competition.

bareroot seedlings

Bareroot seedlings are larger than container stock and preferable for planting in areas where no scarification was required.

planted by hand

Tools and the method of planting adopted vary according to the type of seedling and container used.

There are different tools for planting bareroot seedlings.

no air around roots

For bareroot stock, the mattock or shovel is used to break the soil and the seedling is inserted into the hole. The seedlings are planted upright with their roots placed vertically in the soil. The soil around the roots must be packed tightly to eliminate air pockets. Container seedlings are inserted by an implement such as a "dibble".

spacing

Seedlings are carefully planted 2 meters apart to provide adequate growing space for future development. Approximately 2,500 seedlings are planted in each hectare of land (1,000 per acre).

Mixed Stand

species mix

Mixed wood or a "mixed stand" refers to a combination of hardwoods and softwoods growing in the same forest stand.

protective role

Although hardwood brush is often chemically controlled so it will not choke out the softwood seedlings, some hardwood species perform a valuable protective role to the soil and to the softwoods in the stand.

solution

A mixed stand works well but can decrease economic return in some situations. It is difficult to manage and protect. Hardwood control is the most common solution.

Shrub Control

four methods

There are four ways to control undesirable hardwood: manual — with knives and axes; motormanual — with clearing saws and chainsaws; mechanical — with a lawn mower style machine; and chemical — with either foliage application, trunk injection or stump treatment.

herbicides effective

The common choice of using chemicals is because of its low cost of application, its effectiveness and its relative safety.

management tool

The active chemical ingredients of herbicides stimulate abnormally fast growth in the hardwood bush, thereby upsetting its metabolism and killing it.

effects on wildlife

Because herbicides cause drastic changes in vegetation, there could be effects on the feeding habits of animals in that environment, although this has not been clearly established. If the habitat vegetation changes, the animals may simply move to another location or habitat. Some birds and fish are adversely affected by some herbicides. There are now indications that some herbicides contaminated with minute traces of dioxin may be harmful to human health. When used, herbicides must be applied under strict safety measures.

Thinning

Growing trees can be compared to growing a crop of carrots or radishes. Crowding the individuals reduces the growth rate and the health of each individual.

competition

Trees growing in a natural stand are always competing with other trees for nutrients, light, water, and space.

survival of fittest

The weakest trees in the stand die off naturally over a long period of time, allowing those remaining to continue to grow. This natural "thinning" process is nature's way of helping the strongest to survive and grow.

instrument
improve conditions
shortens rotation
better quality

Man uses thinning as an instrument for increasing the growth of the trees he will eventually use. Thinning is a calculated manipulation of a stand to improve growing conditions for the remaining desirable trees. Because the tree left after a thinning will develop and reach the desirable size faster, thinning actually shortens the time it takes for a tree to reach the size when it can be harvested. Thinning also often increases the quality and health of the tree because a fast-growing tree is less susceptible to sickness and insect attacks.

more $

Bigger and better trees in a shorter time means greater financial return for the owner.

investment thinning

All thinning operations can be viewed as being an improvement and investment for a future return. A first thinning is done in a young sapling stand (age 10-25 years), when the trees are 2-4 meters in height. This is called pre-commercial thinning because in most operations the felled trees have no economic value, according to our current utilization standards. On occasion, there are operations where the felled material is chipped. Approximately 2,500 trees are left on a hectare (1,000 per acre), which are spaced approximately 2 meters apart.

return on investment

When trees reach 10-15 cm. diameter at breast height (DBH), they can be thinned again but this time the trees removed can be used for products like pulpwood, fence posts, etc.

Thinning has several advantages for the stand: (1) the species composition can be controlled during the rotation; (2) there is an increase in value because of the accelerated growth in tree diameter; (3) the merchantable wood which would otherwise be lost to mortality during natural stand development is salvaged; (4) the quality of the remaining trees is improved; and (5) the lifespan, also called the rotation, is shortened.

Pruning

natural pruning

Natural pruning consists of three steps: (1) killing and (2) shedding of the branch, followed by (3) healing over of the branch stub. The initial density and vigor of the trees in a natural stand determine the rate of dying of the lower branches. These trees grow to maturity with no branches on the lower sections of the trunk.

imitate nature

In a thinned stand forest managers imitate nature by removing the lower branches on trees 1-2 cm. (3-5 inches) in diameter on a limited number, 200-500 per hectare (80-200 per acre) of fast-growing, high quality trees. However, this is an expensive practice and for that reason not widely used.

clear material in demand

The resulting knot-free timber is in high demand by sawmills and veneer mills. When processed, this clear material provides high-quality, high-priced raw material for furniture and veneer products.

shorter time

Pruning is a management tool practised to create quality wood in the shortest possible time.

Fertilization

Fertilization is applied to a few high-quality forest stands to increase the volume production of the stand. It is usually applied to a near-mature, well-managed stand.

good economic return

The most commonly used fertilizers contain nitrogen (urea). It is applied 7-10 years before the planned harvest and can bring 10-20 percent return on the investment.

caution

Caution should be exercised when applying fertilizer so nearby water sources are not contaminated.

CREATING A NEW FOREST
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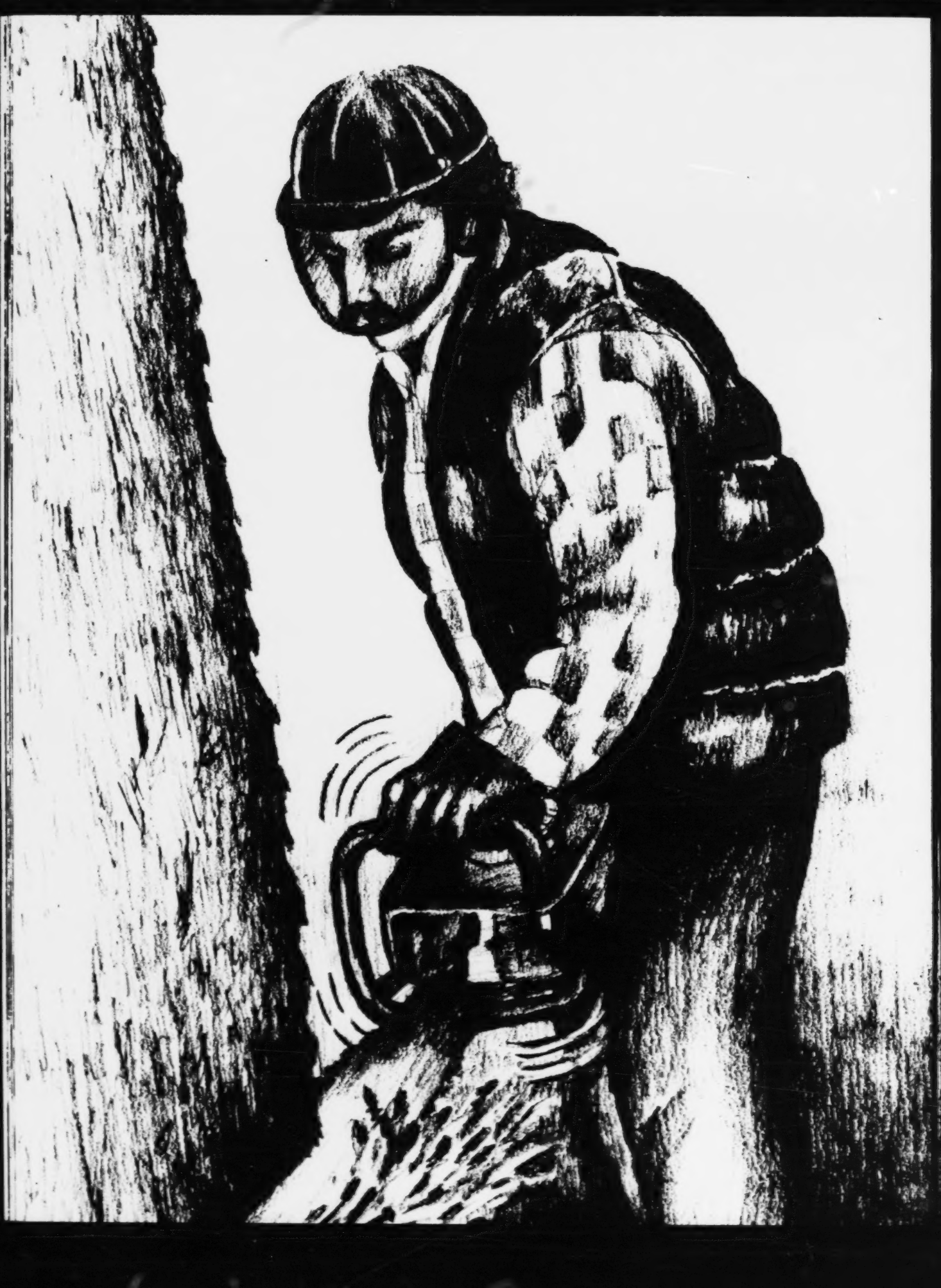


The Harvest

The Harvest

definition

The term "harvest" is used to describe any operation which removes products from a forest for the purpose of using or marketing them.

clearcut

The harvest can be done as a clearcut — in theory, the removal of all trees from the stand. In practice it may refer to commercial clearcutting which is the removal of only saleable trees leaving much undesirable material standing.

thinning

A thinning is a cutting made in an immature stand to improve quality, to improve species composition, to obtain greater merchantable yield, and to recover material that may otherwise be lost.

the plan

The long-term management plan identifies how and when a stand should be thinned, clearcut or reforested. Management plans are mandatory on Crown Land, and are encouraged for owners of private land.

the purpose of plan

The purpose of the management plan is to provide a schedule for different treatment of the stands which will lead to an even supply of merchantable wood from the various stands in the forest. This even supply is often referred to as "sustained yield".

allow for profit

The costs of the proposed treatments should be within the estimated return from the sale of the products produced.

allowable cut

The amount of wood which can be harvested each year, also called the annual allowable cut, is based on the annual growth:. It is an estimate which depends on factors such as site quality, tree species, the age of different stands and the intensity of management. Stands damaged by the spruce budworm would suffer a decline in annual growth, thus decreasing the annual allowable cut in the long-term.

economical lifespan

rotation

The economic lifespan of an even-aged stand in New Brunswick which is often called the rotation period, is usually 40-80 years for most species. This period is longer if the primary purpose is to produce sawlogs and similar high quality products; shorter if the desired end product is pulpwood or firewood.

The Thinning Operation

reduce competition

The purpose of thinning a stand is to reduce the competition, increase the growth and shorten the rotation of the trees which are left.

improve investment

Thinning can be compared to an investment where the purpose is to maintain and improve the capital: the remaining growing trees.

imitating nature

Thinning is the utilization of one of nature's methods for man's benefit or speeding up nature for man's benefit.

investment thinning

The first thinning is usually done when the trees are 10-25 years old (2-4 meters high). This operation is sometimes called pre-commercial thinning, because the felled trees are usually left on the ground and the owner gets no return. The operation is purely an investment for the future.

Clearing saws are more and more being used to space trees in young stands.

commercial thinning

Any further thinning, done when the trees reach 10-15 cm. in diameter at breast height, can bring an economic return, because the felled trees usually can be processed and sold.

sustained income

Several careful thinnings can provide a sustained income to woodlot owners with limited-sized woodlots and will lead to a superior quality final forest.

The Clearcut Operation

copying

nature's method

Clearcutting is basically an effort by man to copy one of nature's methods to bring a new stand on a piece of land. In the natural forest, a stand can be "clearcut" by a severe fire, insects or wind storm. In the managed forest, a clearcut is carried out as part of the planned management of the forest.

mature and over-mature stands

An even-aged stand which has reached the point where it starts losing volume from trees dying faster than growth can replace the losses is ready for the final harvest. The stand is over-mature and should be clearcut, to make room for a new stand.

complete removal

A planned and supervised clearcut means that all trees are removed. The ground is subsequently prepared for reforestation.

natural regeneration

Nature often begins the new stand in the shade of mature stands, a process known as "advance growth". The term "natural regeneration" refers to the development of small seedlings naturally established from the seeds of local seed bearing trees.

"seed trees"

Forest managers sometimes help nature produce a new natural stand by leaving 18-25 quality seed trees per hectare during the clearcut operation. These are removed only after a new generation of trees has become established.

planting

It is advisable to prepare the site and plant the cut-over area if advance growth is not present, or does not survive the clearcut operation, or if the manager does not expect a new stand to develop from seed that fell during the year of the harvest, or from adjacent stands.

aesthetics

A clearcut may be aesthetically offensive to some people. However, it is only temporary because a new crop of trees grows up within a few years.

benefits for wildlife

A clearcut is beneficial to some birds and animals because the new forest creates a fresh food supply. This harvesting method produces an "edge effect" which places food in easy reach close to the shelter provided by the standing forest.

reduces fire hazard

Stands devastated by the budworm create a fire hazard which is substantially reduced if the stand is swiftly clearcut, and the area reforested.

Harvesting Methods

harvest

"Harvesting" means the work done to cut the trees off the stump, process and transport them to a road where they can be taken to an industry.

machines

The forest worker, equipped with a chainsaw, fells, limbs, tops, and cuts the tree into sections. Specialized machines can also perform the same job.

3 systems

There are basically three harvesting systems currently used in New Brunswick forests.

tree length

The "tree length" system is the most common, accounting for most of the harvested wood. Here, the individual tree is felled, limbed, sometimes topped and winched or skidded to a road where it is either cut into sections or transported to the industry full length.

short wood

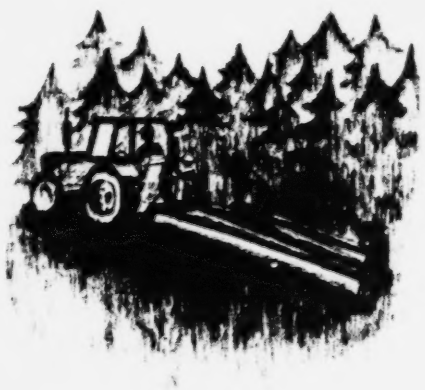
The "short wood" system is mainly used by woodlot owners and contractors operating on private land. The tree is felled, limbed and topped but also cut into sections where it has fallen. These short lengths of wood are piled and later picked up by a forwarder (porter) which carries the wood to a truck where it is reloaded for further transport to industry.

full tree

The third method for removing wood from the stand is the "full tree" system. With hardwood pulpwood, the tree is felled, skidded or forwarded to a "full tree chipper" which chips the whole tree trunk, branches and leaves. This "chipping" method is not common to New Brunswick but is considered a method of the future. The similar method for softwood is to select and cut off logs before the rest is chipped.

mechanization desirable

Mechanization of harvesting operations is increasing. This is desirable because it increases the productivity of the individual worker, is safer and is less dependent on the weather. Its disadvantages are that it reduces jobs and can cause regeneration problems.



advantage of scale

Full-mechanized operations require large areas and large volumes of wood to be efficient. Harvesting operations on small woodlots will therefore have to rely on semi-mechanized systems and new developments of methods adapted to the smaller size of the operation.

minimum volume of wood for operating

As the size and volume of trees in a stand increase, harvesting becomes more economically feasible. The removal of at least 75 cubic meters of wood per hectare (8 cords per acre with less than 30 trees per cord) is considered the minimum necessary to make a harvest economically feasible.

production per lifespan

During one full rotation from seedlings to final harvest, one hectare has the potential to produce 250 cubic meters or more (30 cords/acre) of wood if thinnings are done.

THE HARVEST
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Tree Improvement

Tree Improvement

fiber, lumber yields

Tree improvement in New Brunswick is done primarily to increase fiber and lumber yields.

wood shortage

The predicted shortage of quality wood increases the requirement for superior trees. Therefore the current work and research for improvement of desired species is crucial to the future of forestry.

plus-tree selection

Plus-tree selection is the most common process used in breeding superior trees.

desirable characteristics

The chief characteristics desired are fast growth, straight stems and less than usual branchiness.

collect seeds

Professionals look throughout the forest for superior trees and collect seeds (cones) or cuttings (branches) from which to grow other trees. Reproducing a tree by rooting a branch is a vegetative method also known as 'cloning' or grafting.

selection question

The initial selection is made by checking the phenotype (appearance) of the tree. The first question is whether a tree is superior because of its genetics (genotype) or its environment (nutrition and growing conditions).

genetics responsible?

Testing of the seed from the superior tree determines if genetics are responsible for the parent trees' superior qualities.

family test

The seeds or cuttings taken from the forest are planted in containers in a nursery. When they are seedlings they are planted in a fairly uniform site, exposed to conditions and tended for 10-15 years. This is the family test: the young saplings which are then superior came from the genetically superior female parent; those which are inferior came from the female parent which was only superior due to its environment.

seed orchard

The superior trees, the plus-trees — are used to establish a seed orchard, which is carefully cultivated to produce seed more regularly and in larger quantities. Seed orchards exist in New Brunswick but as yet there is no production of superior seed or plantations of superior trees.

pollination control

Growing trees from seed collected in the forest only controls half the genetic make-up of the new tree. Complete control of the trees' genetics is achieved when pollination is also done under controlled conditions.

improved Christmas trees

The Canadian Forestry Service, the Department of Natural Resources in New Brunswick and the Department of Lands and Forests in Nova Scotia are attempting to promote superior balsam fir Christmas trees. They hope to increase the bushiness and length of needles of the balsam fir.

superior forest

Stands of these improved tree species will, in the future, be known as the 'plus forest', the 'new forest' or the 'genetically superior forest'.

TREE IMPROVEMENT
Recommended Reading

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Better Utilization of the Tree

limited source

New Brunswick has a limited forest resource so we must use the available wood to its full potential. The wood supply is used to produce natural wood products (lumber), fibre products (pulp) and wood products processed in other ways (panelboard, etc.).

quality wood shortage

. The serious shortage of quality wood and the increasing cost of raw materials is forcing forest managers and wood producers to re-examine current harvest and production methods.

Primary Forest Industries

economy responsibility improvements, innovations

The sawmill industry and the pulp and paper industry each have heavy economic involvement in New Brunswick, and share a responsibility to improve their methods of utilization. They can refine current production methods, implement new technology and reduce waste by using residues for new products or energy.

waste

Raw materials waste in the pulp and paper industry has been estimated at more than 50 percent. Therefore, a reduction of this waste means the potential for increased product yield is high.

New Products

alternatives numerous

The demand for new products is increasing. Fibreboard, particle-board, flakeboard, waferboard and laminated products are used for furniture, wall and floor construction. Made from scraps, chips, pieces glued together or raw fibre, these new products are cheaper than traditional veneer and lumber to produce and, in many ways, equal to or better than the traditional products.

non-fibre products

A number of oils and chemicals can be extracted from wood fibre.

Whole Tree Utilization

logging waste

Some raw material is wasted because our present technology excludes utilization of the stumps, tops and branches, from thinnings and clearcuts.

future method

Whole tree utilization (everything except the stump) is a 'method of the future' in New Brunswick. It has proven to be an effective source for wood products and energy in more experienced countries such as Sweden. Stump harvesting, particularly, is a successful commercial operation there.

site preparation

Removing debris (tops and branches) from the forest floor makes reforestation easier but organic material must remain to provide soil nutrients.

Further Processing

export finished products

Wood can be processed past the pulp or veneer stage. After being dried, the raw material can be used for furniture, prefabricated houses, or other finished products suitable for export.

costs, profits

New methods used to improve wood utilization may cost more initially, but the increased yield will correspondingly boost profits.

BETTER UTILIZATION OF THE TREE
Recommended Reading

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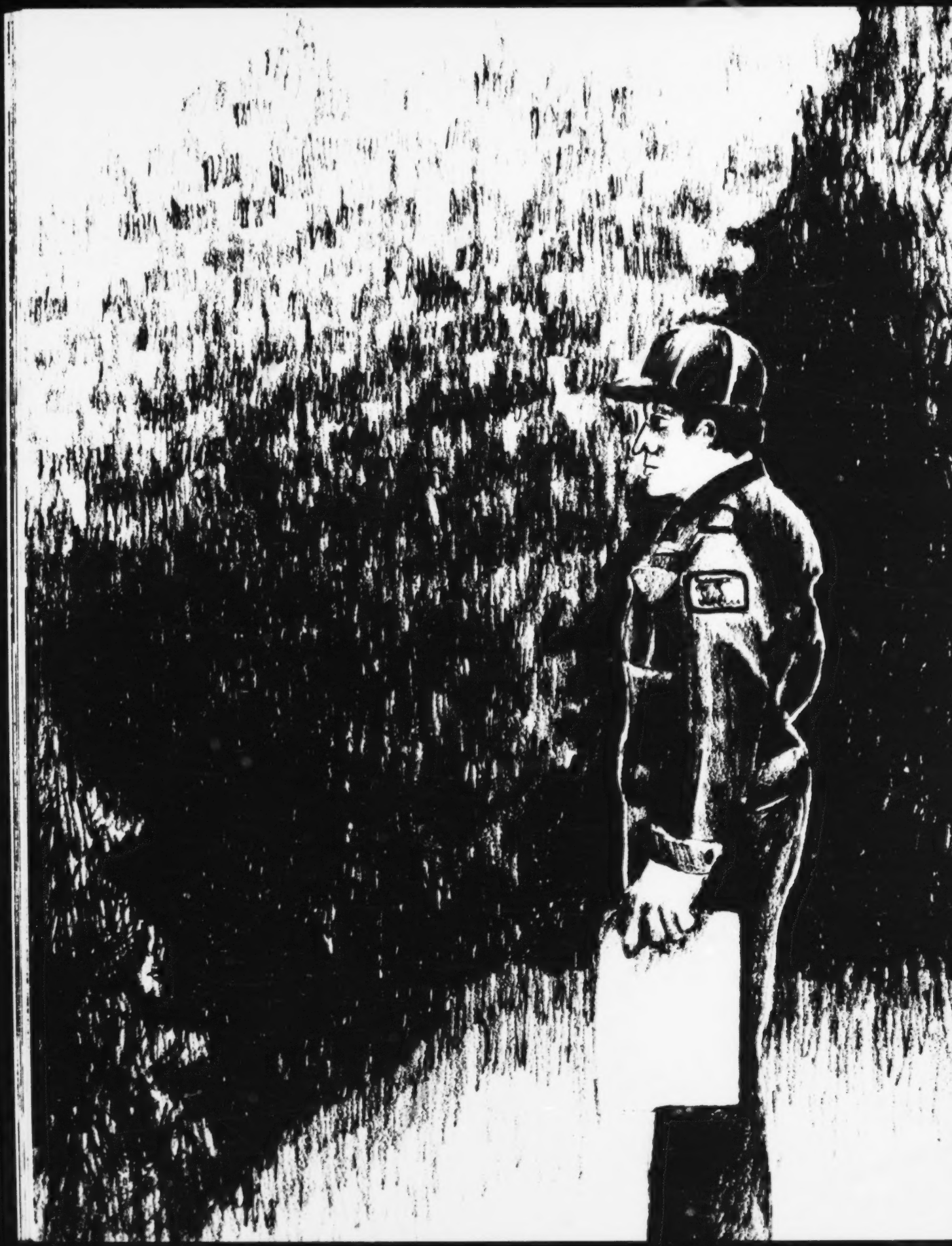
Project Whole Tree Utilization: Final Summary Report 1977 by Sevedish Forest Industries (1974-77) and the Royal College of Forestry.



Will there be Enough Trees?

Will there be Enough Trees?

shortage of quality

fir, spruce

New Brunswick has moved from an abundance to a shortage of quality harvestable wood. After three centuries of forest use without much long-term management, the industry teeters on the brink of an uncertain future. The lack of good-sized fir and spruce, the basis of our sawmill industry, poses the main problem.

volume surplus

However, in gross terms there is no real shortage of wood fibre and there is even a surplus of hardwood fibre. This fact lulls us into false security. But when wood is examined for quality there will not be enough to satisfy the demand.

low value, few uses, inaccessible

The plain truth is that most of this low quality wood is less valuable and has fewer uses by our current utilization standards. Our forest industry is geared for higher quality wood and there is less and less of this wood available from our forest.

sawlog availability

Good size sawlog production requires longer growing time, thus different management from the fibre forest presently predominant on Crown forests.

manageable

The situation is serious for the sawmill industry, but experts believe it will be manageable.

allowable cut

Growing stock levels decline from over-harvesting or cutting more than the forest produces each year, so theoretically the growing stock of trees could be eliminated. Forest managers do not expect this to happen as their 'allowable cut' policy limits the annual harvest.

may peak in 15-30 years

The worst period in New Brunswick forest history may arrive in 15-30 years, when the predicted fiber shortage may be at its peak.

budworm persist

Three ongoing factors contribute to this crisis. The spruce budworm will continue to damage large sections of the forest each year and, while controlled to a degree by chemical insecticide application, no method of total elimination has been found.

unmanaged forest

Secondly, the task of converting a primarily unmanaged forest to a managed one is difficult, costly and time-consuming. Much of the forested interior of the province is a mature forest damaged by a prolonged spruce budworm infestation. This presents management difficulties and poses a fire hazard.

labor cost

Thirdly, if inflation continues, the cost of labour can also be expected to rise.

stop disaster

Intensive forest management now cannot avert the fiber/quality wood shortage but it can stop the problem from causing economic disaster. This management must include the best biological care and protection of trees and their maximum economical use.

awareness

Continued advancement in forest technology and increased public awareness may also prevent this 'shortage' situation from recurring.

action now

Will there be enough trees? Yes, if we use what we have with care, while managing and protecting our renewable resource.

WILL THERE BE ENOUGH TREES?
Recommended Reading

Manning, Glen H. and H. Rae Grinnell, *Forest Resources and Utilization in Canada to the Year 2000,* Publication No. 1304 Canadian Forestry Service, Ottawa: 1971.

"Trees For the Future", Department of Natural Resources, Fredericton, N.B.

MAPLE
PRODUCE

Other Fiber & Non-Fiber Uses/Products

Other Fiber & Non-Fiber Uses/Products

economics
local sales,
export

There are other fiber and non-fiber uses of forest land (besides the obvious timber resource) which have an economic return. These include the production of Christmas trees and maple-sugar. These are sold locally or exported.

Christmas
trees

Growing and marketing Christmas trees is now a common industry in New Brunswick, and, as with timber production, is a long-term investment.

maple sugar,
blueberries

Renewable leases for maple-sugar or blueberry areas on Crown Lands are available. Working a maple sugar bush on Crown Land or private woodlot can bring substantial income to individuals.

non-renewable
resources

Peat moss, sand and gravel (non-renewable resources) are extracted from the land. The processes can cause environmental and scenic damage but are profitable in the short-term.

campsites

Outdoor recreation in many forms is increasing, resulting particularly from the demand for campsites in national and provincial parks.

balanced
ecology
angling,
hunting

Maintaining healthy wildlife populations is also a priority for many individuals and conservation groups. Besides helping to maintain an ecological balance, and for aesthetic considerations, substantial populations of game birds, game animals and fish provide recreational opportunities for hunting and fishing.

OTHER FIBER AND NON-FIBER USES/PRODUCTS
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Scovil, Harold Raymond, *The Marketing of Christmas Trees in New Brunswick*, N.B. Department of Agriculture and Rural Development.

Leaflets on these fiber and non-fiber products are available from the Department of Natural Resources, Forest Extension Branch, R.R. #5, Fredericton, N.B.

What Happens to Fish and Wildlife?

What Happens to Fish and Wildlife?

total picture

Animals, birds and fish are an integral part of the natural environment and require management consideration just as do trees, water and soil.

recreational resource

Apart from their intrinsic value, fish and wildlife represent a recreational resource, and as such, have always contributed towards our way of life and the economy.

early settlers

The way of life of our early settlers was, to a certain degree, determined by the natural environment and what it offered. In particular, our early newcomers relied on fish and fur bearing animals because they provided the first means of survival-food, shelter, clothing and trade.

integrated management

Today, society relies to a much lesser degree on animals, birds and fish as a means of survival. The emphasis today is mainly recreational. To enhance this and other interests, the forest is being managed with these concerns in mind. The habitat of fish and wildlife is being managed, protected and integrated into the total management of our resource.

costs

Funds for fish and wildlife management and enforcement are provided from general revenues. Nearly $2 million are derived from the sale of licences to users of the resource.

FISH

New Brunswick's waters

In New Brunswick there are 52 rivers providing about 1,400 miles of Atlantic salmon and trout water. There are 1,990 ponds and lakes and more than 18,000 miles of streams.

angling

The Department of Natural Resources recognizes the social and economic value that can be obtained from the enhancement and wise use of the sport resource. Salmon angling continues to draw sports fishermen from all over North America. Although Atlantic salmon angling is often placed in the limelight, the majority of anglers prefer to fish for brook trout, perch, bass or pickerel. In line with this, special emphasis is being placed on non-Atlantic salmon species, as these have the greatest potential for satisfying angler demand.

Angling is a growing outdoor activity enjoyed by many users of the sport resource.

man and logging

Preservation of the habitat is essential for the development of fish stocks. In the past forest operations have adversely affected the aquatic habitat, thereby affecting fish populations. Today, with the New Crown Lands and Forests Act, the co-ordination and integration of management objectives and procedures at the planning level will greatly protect fish populations. This means that both foresters and biologists will be working closer together to insure true multiple-use management of our forests.

government control

The federal government has virtual control over coastal and inland fisheries, determining the open seasons and maximum catch limits. The province makes a substantial contribution to angling regulation, enforcement and management on a co-operative basis with the federal government. More specifically, the provincial authorities sell angling licences and provide opportunities for fishing on New Brunswick Crown reserve waters.

WILDLIFE

habitat

extent

Like fish, wildlife populations are dependent on habitat. The kind of habitat or stage of forest development will determine the species and abundance of wildlife to be found. Ever since man came to the forest of New Brunswick, he has to some extent influenced the habitat of our native species. The influence has been beneficial for some species and detrimental to others.

caribou and wolves

When our early settlers first arrived they saw a predominantly mature forest that stretched as far as the eye could see. This forest provided shelter and a good habitat for caribou. Wolves were also common and tended to thrive quite well where caribou were present. The use of the forest created conditions favourable for deer but reduced the ability of the land to support caribou.

Ruffed Grouse

The change in the species composition and age structure of the forest has been beneficial to Ruffed Grouse. We have more Ruffed Grouse now than before the white man came. Much of our coniferous forest has been cut or burned, and succeeded by aspen and other broad-leaved trees like birch that provide the buds which are its staple winter food.

white-tailed deer

Since the white-tailed deer in New Brunswick are living in the northern part of their range, the condition of their winter habitat influences their survival. The protection and improvement of identified deer wintering yards along with the mild winters have contributed to the ever increasing numbers of deer over the past several years. Areas that are identified as deer yards are subject to special harvesting operations. With the recommendation of a biologist a deer yard may receive treatment in the form of patch and strip clearcuts. The shapes and sizes of these cuts when controlled provide new food while still maintaining adequate shelter. Shelter and food are essential for the winter survival of deer.

moose hunting

Changes made in the habitat of moose will too affect survival, but to a lesser degree. With improved control over moose hunting and concern for their habitat, the welfare of moose is being enhanced.

fur-bearing animals

Smaller animals such as beaver, muskrat, mink, raccoon, fox, fisher, otter and bobcat are trapped for their fur. Many larger mammals are dependent on small mammals for food. Forest songbirds add much to the enjoyment of being in the woods.

remarks

Since fish and wildlife are components of the forest complex, they are entitled to the same consideration as is given to the trees, the water, the soil and the atmosphere — within a policy of balanced multiple use. With the growing pressure upon the fish and wildlife resource, there is more need than ever before to wisely manage our forest resource.

FISH AND WILDLIFE
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Enemies of the Forest

Enemies of the Forest

damage

The forest of New Brunswick has many enemies which can damage or kill individual trees and when present in epidemic proportions, can nearly eliminate stands or sections of the forest.

defoliators and other damaging insects transfer disease

Insects form a complex group. Some insects like the defoliators sustain themselves by feeding on leaves. Other forest pests like wood borers and bark beetles restrict their attacks to specific parts of a tree. They are often responsible for transferring disease (i.e., fungus) from a dying or dead tree to a healthy tree.

fungus

Insects are often the primary attacker but they do not always kill the tree. They reduce it to such a weakened condition that wood borers, bark beetles and wood rotting fungi finish off the tree.

nature's way

Decay is nature's way of recycling nutrients by disposing of wood to allow new growth in the forest stand.

fire

But dead, dry timber is a common target for another of the forest's enemies: fire.

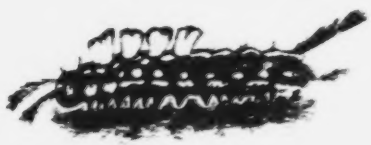
pests introduced

Some of the major pests, with the exception of the spruce budworm, are not native to New Brunswick and Canada, but were introduced in the late 19th century, before quarantines were required on imported goods. (for example, European Elm Bark Beetle)

Insects

softwoods

Insects which feed on softwoods include; spruce budworm, balsam gall midge, balsam twig aphid, larch sawfly, red pine sawfly, tussock moth, white pine weevil, sawflies and balsam woolly aphid.



The whitemarked tussock moth at the mature larval stage.

hardwoods

Some pests which feed on and damage hardwoods are; beech scale, tent caterpillar, oak leaf shredder, greenstripped mapleworm and saddled prominent.

The Spruce Budworm

devastates fir, spruce

Perhaps the best known and most damaging insect in New Brunswick forests is the spruce budworm which attacks fir and spruce in devastating numbers and has survived man's steady attempts at crop protection control since the early fifties.

lifecycle

The budworm moth lays its eggs during July or August and these hatch after 10 days. In spring the larvae emerge as small caterpillars, feed for about five weeks on the new tree buds and new foliage until they enter the cocoon stage for 10 days. Then another generation of moths emerge and repeat the cycle.

large reproduction

80 percent dead trees

The budworm is remarkable because of its unusual capacity for reproducing in large numbers and for the high survival rate of its young. A mature stand with only five budworm larvae per tree could have 20,000 budworms on each tree in six years. In this unprotected situation, approximately 80 percent of the stand would be dead within a relatively few years. Data have shown that three to four successive years of severe defoliation can cause widespread mortality.

millions of acres

There are now 4-6 million acres of budworm-infested forest area in New Brunswick and the current epidemic shows no sign of disappearing.

protect economy

Because New Brunswick's economy relies so heavily on the success of its forest industry this serious threat to its survival is more than enough to spur protective action.

insecticides and control

Chemical insecticide spray (aerial) programs retard the growing numbers of budworm marginally enough each year to maintain foliage on the crop trees. So, there has been some control over a pest problem that would otherwise destroy most of the forest and with it, the economy of the province. However, ongoing research attempts to find alternative methods of protection.

ongoing research

The Balsam Woolly Aphid

introduced pest

The balsam woolly aphid was introduced from Europe and has plagued fir trees in New Brunswick since the thirties.

secretes waxy substance

It is a tiny insect which inserts a "feeding tube" into the bark of the fir, secreting a salivary material which directly damages the tree.

twigs swollen trunks killed

Infestations on twigs distort growth, making the tree unmarketable for quality products. However, heavy infestations on the tree trunk will kill the tree in about four years.

peculiar reproduction

The aphid reproduces asexually (from unfertilized eggs), usually twice yearly. As it matures, a distinctive white, thread-like covering grows on its body — thus it's name "woolly".

clearcut and burn

An effective means for controlling the spread of the aphid to date has been to clearcut infested stands and burn the slash on a limited scale. Reducing the fir content of stands is also sometimes effective.

The White Pine Weevil

abnormal growth

The white pine weevil causes severe commercial loss because it stunts white pine, reducing both the commercial wood volume and the quality of the wood.

attacks "leader"

The weevil attacks the terminal shoots, or "leader" of the tree, killing the top and leading to abnormalities such as a crooked trunk or multiple-stemmed tree.

larvae destroy cambium

The adult lays eggs in cavities of the tree made where it has chewed and the larvae feed on the tree's cambium (a thin layer of cells between the bark and the wood).

silviculture

Chemical insecticide applied in early spring is effective. Regenerating white pine in the shade of the parent stand where the level of light intensity is about 50 percent has also proven to be a deterrent.

The Forest Tent Caterpillar

growth reduction

The forest tent caterpillar attacks poplar, sugar maple, red oak, basswood, willow, alder and birch reducing the growth of these trees.

campers

Heavy infestations of this pest drive away campers and tourists.

attack foliage

Eggs are laid in summer and larvae emerge in the spring (late April to early May), feeding on opening buds. Later they attack the foliage, stopping only if the weather turns cool.

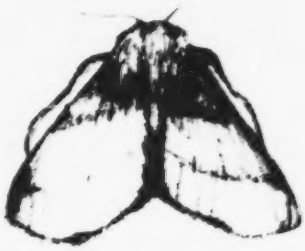
clusters

Despite their name, this is one species of tent caterpillar which does not form "tents" but feeds in clusters.

insecticide control

Heavy concentrations of this insect can strip a tree of all its leaves. This pest can be controlled with a chemical insecticide application, which is most effective if it is sprayed shortly after the leaves come out. It is possible to control tent caterpillars on smaller shade trees or small groups of trees by cutting off and destroying twigs with colonies of caterpillars or by removing egg masses from the twigs after leaf fall.

(a) The eastern tent caterpillar



(b) The female moth of the forest tent caterpillar.

Decay

kills trees

Decay is the real killer of trees. Insect pests may severely damage the growth of a tree and reduce it to a weakened state where it is more susceptible to fungus attack and eventual decay.

fungi

Fungi, such as those which produce Dutch Elm Disease, White Pine Blister Rust or Armillaria Root Rot, can also wipe out a healthy tree.

Dutch Elm Disease

familiar sight

The damage caused by Dutch Elm Disease is familiar to New Brunswickers. The tall, bleached skeletons of trees still standing are evidence of its total destruction.

bark beetles

The fungus is produced in dying elm trees and carried to live trees by bark beetles which breed in dead wood but feed on healthy trees.

rapid process

The foliage turns brown and eventually falls off an infected tree, a process sometimes only taking a couple of years to kill the tree.

preventative measures

No general practical method of halting the disease has been found but preventative measures can help. The immediate destruction of dying elm trees to prevent the development of the fungus and the use of pesticides to kill attacking beetles, sometimes reduce the spread of "infection".

White Pine Blister Rust

rings bark

White Pine Blister Rust is a fungus that attacks white pine of all ages, killing the bark in an increasing area until the trunk is ringed with infection and dies.

The disease needs to alternate from white pine to currant or gooseberry bushes and back to white pine during its lifecycle. Because of this, the disease can be controlled by eliminating the alternate host. The plants are either removed manually or killed by chemical herbicide application. Controlled burning is also sometimes effective.

Armillaria Root Rot

causes decay — Armillaria Root Rot attacks all variety of trees, hardwoods as well as conifers, causing serious root and butt decay.

roots infected — This parasitic fungus "Armillaria Mellea" moves from the roots of an infected tree to a healthy one. Its infectious strands penetrate the bark and when the tree is dead the fungus decays the wood.

fruiting body — The fruiting body is a honey-colored mushroom that usually grows in clumps at the base of a dead tree.

plantation — The fungus can cause the death of several trees in a plantation and is difficult to control.

treatment — Removing infected material, including the stumps and root systems, is one method of preventing the spread of the decay.

prevention — Preventative measures of a silvicultural nature — for example, increasing the planting distance between trees — are sometimes successful. The most effective control is to maintain a vigorous stand and plant species suited to the site.

Combating Pests

cyclical — These "enemies of the forest" cause damage to certain species but when infestations or attacks are left untreated, nature over time eventually corrects the damage by restocking the area. It must be remembered the forest is a self-renewable resource. Therefore these "enemies" are actually enemies of man, who competes with them to utilize this resource for his own benefit and suffers economic loss when it is damaged or destroyed.

Canadian Forestry Service — To combat insects and disease, the Canadian Forestry Service supplies technical advice and assistance, assesses damage done to the forest and forecasts areas of severe insect damage. It also assesses the effectiveness of the budworm spray program using data from an egg mass survey, as well as monitoring side effects of chemicals used.

Animals

Wildlife, while not really an enemy of the forest, is sometimes responsible for damage done to trees in a stand.

mice — Voles, mice and hares often ring a tree of its bark, effectively killing a young tree.

moose — Moose, and to a lesser extent, deer, bend or break saplings and devour top shoots of young conifers, which spells disaster in a newly replanted area.

porcupine — Porcupine live almost completely on a diet of bark, especially conifers. Eventually the circulatory system of the tree can be so damaged by porcupine gridling that it dies.

Fire

destructive — Fire is a spectacular destructive force, certainly an enemy to trees and the wildlife which inhabits the forest.

lightning, carelessness — Although some fires are caused by lightning, most occur as a result of human carelessness.

fire season — April - October is generally considered to be the forest fire season. An unusually dry spring and summer means more and larger forest fires.

6,400 acres destroyed

In 1980, 846 fires burned 2,560 hectares of New Brunswick forest.

provincial authorities

Provincial, not federal, authorities are responsible for fire protection within New Brunswick boundaries, including Crown Land forest.

aircraft ground crews

Fixed-wing aircraft capable of dumping hundreds of gallons of water are now an essential supplement to the handtool crews fighting fires at ground level.

results

There are many negative results from a forest fire. Loss of timber means economic loss for the owner of that forest stand. Small animals and birds as well as their habitat can be destroyed. If the fire is intense, the damage to organic material covering the soil affects the soil itself. Sudden removal of vegetation can affect water sources in the area and can also cause soil erosion.

positive role

Fire also has a positive role: to achieve a natural "clearcut" and allow new growth in the forest. Indeed, it is often used as a form of site preparation under controlled conditions.

reproduction

Some species, such as jack pine, are more or less dependent on fire for their reproduction or regeneration because the resinous cone will only release its seeds under extreme heat.

ENEMIES OF THE FOREST
Recommended Reading

Balsam Woolly Aphid, Canadian Forestry Service, Forest Research Laboratory, Fredericton, N.B. Tree Pest Control Leaflet, 1981.

Forest Enemies, Canadian Forestry Service, Department of the Environment, Ottawa: 1971.

Forest Fire Control in Canada, Canadian Forestry Service, Ottawa: 1974.

Forest Insect and Disease Survey, Annual Report 1976, Canadian Forestry Service, Ottawa: 1978.

Forest Management: Prevention, Protection, Department of Natural Resources, Fredericton, N.B. 1980.

Magasi, L.P., *Forest Pest Conditions in the Maritimes in 1981*, Canadian Forestry Service, Maritime Forest Research Centre, Fredericton: 1982

Pesticides and Their Safe Use, Canadian Agricultural Chemicals Association, Ottawa: 1975.

Reducing Decay Losses in Hardwood Forests and Farm: Bulletin 629, Cooperative Extension Service, Ohio State University.

Report of the Task Force for Evaluation of Budworm Control Alternatives, prepared for the Cabinet Committee on Economic Development, Fredericton: 1976.

Other information, including Canadian Forestry "Fact Sheets" is available from Natural Resources, Forest Extension Branch, R.R. #5, Fredericton, New Brunswick.

The Budworm Spray Controversy

The Budworm Spray Controversy

spraying where needed

Each year some specially identified areas of the New Brunswick forest which need protection are sprayed with chemical insecticide to reduce the number of budworm larvae which feed on foliage. The trees preferred by the insect are spruce and fir. Extensive feeding will reduce the vigour of the tree and eventually kill it.

regulations, precautions

Only licensed operators who have been briefed on government regulation and safety practices carry out this aerial spray program. Health precautions are followed for the operator and crew. Strict rules are applied as to where spraying can or cannot take place. Spraying is not permitted within 500 metres of year-round habitation.

health concerns

The spray program has become an emotional issue, due partly to a reasonable fear of the unknown. Although no real health hazard from the chemical spray program has been proven to exist for animals or humans, the possibility causes public concern.

forest survival

This concern has been weighed against the very real threat posed to forest survival if the current budworm infestation is allowed to continue unchecked.

economy

It is generally accepted that the forest industry is the foundation of the New Brunswick economy. Therefore, if the forests were damaged by budworm, our economy would severely suffer.

shortage

The quality wood shortage, which has already begun, underlines the need for forest protection. Forecasters predict the shortage will become more serious at the turn of the century.

spraying continues

Chemical spraying is considered by many experts to be a necessary evil but until alternate methods are found which provide equally effective protection at an affordable cost, it should continue. The principle is: use just enough protection to keep trees alive; only stands not expected to survive on their own are sprayed.

research

Researchers are diligently experimenting with various methods to kill larvae or prevent the budworm from mating.

spruce and fir; mainstay of forest industry

Replanting the entire infested area with a species which is resistant to budworm is not a practical solution. At present, the adapted local softwoods, spruce and fir are the mainstay of the forest industry. Silvicultural management and forest protection are needed to maintain a healthy and productive spruce-fir forest.

starting from square one

Substantially altering the species composition of our forest would ultimately mean engaging in another seemingly endless search for an insect 'cure'.

control

New Brunswick has a relatively bright future. Timber losses here have been much less than in provinces where no chemical spray program was carried out against the spruce budworm. The damage is being controlled.

THE BUDWORM SPRAY CONTROVERSY
Recommended Reading

Magasi, L.P., *Forest Pest Conditions in the Maritimes in* 1981 *With An Outlook for* 1982 Canadian Forestry Service, Maritime Forest Research Center, Fredericton: 1980.

Forest Management: Prevention, Protection, Department of Natural Resources, Fredericton: 1980.

Report of the Task-Force for Evaluation of Budworm Control Alternatives, Prepared for the Cabinet Committee on Economic Development, Fredericton: 1976.

The Spruce Budworm Issue, exerpt from a speech delivered by the Hon. Len Marchand, Minister of the Environment, Canada at Yale University, April 4, 1978.

Laws and Regulations

purpose of laws

Laws and regulations are created to support the orderly management of the forest resource for the long-term benefit of the citizens of New Brunswick.

total resource

In the past, laws primarily regulated the protection and the exploitation of the forest. Today, the emphasis has been shifted from basically passive protective management to active management. The 1982 Crown Lands and Forest Act sets the frame for total active resource management.

philosophy

The philosophy of New Brunswick forest and environmental laws reflects a commitment to long-term management which provides for long-term benefits and conservation of the total resource.

Crown Lands & Forests Act

new act

The New Crown Lands and Forests Act became fully operational on April 1, 1982. Sections 1, 22 and 27 became law in July 1980.

Crown Lands

The term 'Crown Lands' refers to publically-owned lands (held by the provincial government) which are not under the jurisdiction of any other government department.

everyone responsible

The act identifies responsibilities and the distribution of responsibilities between private land owners, government and industry in terms of wood supply and protection of the resource.

mill use only

Crown Land is allotted for use only to companies operating mills in the province. However, individual permits for firewood and small amounts of other classes of wood are still available.

allocations on area

Allocations of Crown forest are based on area, not wood volume. In this way, good forest management will mean increased resources and profits in the long-term.

licencees responsible

The Crown Land entitlements will be issued as licences, sublicences and permits. Licencees will have to assume full management responsibility.

detailed management agreement

This responsibility will be outlined in the Forest Management Agreement which is signed between the licencee and the Department of Natural Resources. The Forest Management Agreement will consist of an Industrial plan, a Management plan and an Operating plan.

routine management

Routine management functions will be carried out and paid for by each licence holder. They include the building and maintenance of roads and bridges. As well, a harvested stand must be left in a state favorable to natural regeneration.

NEW BRUNSWICK FORESTRY STATISTICS

New Brunswick has the highest percentage of land area classified as forest land in the world: approximately 92 percent.

Ownership of forest land is as follows: private land, 55 percent; provincial, 41 percent; and federal, 3 percent.

Crown Land, almost all forested, consists of 4,752 square kilometers (half the total land area).

The processing of forest products accounts for one-third of all employment in the manufacturing industry while nearly half of all our manufactured goods are forest products.

One in seven of all employed people works in forestry or related manufacturing.

Pulp and paper mills provide the highest paid employment to the most people of any single industry.

There are two groups of trees. Softwoods comprise 71 percent, hardwoods comprise 29 percent of the forest in New Brunswick.

As of 1980 the total standing wood volume from all species was approximately 579 million cubic meters.

New Brunswick harvests more wood per hectare than any other province in Canada.

More than 60 percent of all exports are forest products. This compares to: agriculture, 5 percent; fish products, 7 percent; mining and mineral products, 14 percent. Forest resources provide 25 percent of our gross provincial product.

The annual revenue from nonconsumptive (non-fibre) uses of forest land, including angling and hunting licences, trapping, harvest and outdoor recreation, exceeds $12,500,000.

NEW BRUNSWICK STATISTICS
Recommended Reading

Annual Report 1980-81, Department of Natural Resources, Fredericton: 1980.

Report of the Forest Resources Study 1974 (Executive Director R.E. Tweeddale), Fredericton: 1974.

GLOSSARY OF TERMS

Annual allowable cut —
the amount of wood which can be harvested annually from a specific area on a sustained basis.

Annual ring —
the layer of wood produced during one year's growth of the tree which appears as a distinct 'ring' in a cross section

Breeding —
the practice of genetically improving a tree species

Cambium —
a thin layer between the bark and wood which is one cell thick

Clearcutting —
the removal of all merchantable timber products, thereby making the ground ready for the next generation of trees. The 'capital' (growing trees) is removed for profit and the money is sometimes reinvested

Clone —
an identical reproduction of a tree species derived from vegetative propagation

Conservation —
the intelligent utilization of a renewable resource without depleting or unduly disturbing the balance

Coppice —
a forest stand originating primarily from sprouts

Crop tree —
a tree which will produce a valuable product such as sawlogs

Crown —
the branches and foliage of a tree

Crown canopy —
the continuous cover of branches and foliage formed collectively by a stand of trees

Crown Land —
see page 61

Cubic metre —
a unit in forestry which refers to a volume of solid wood

Cull —
or reject: a tree or log made useless to the forest industry because of poor form, rot, excessive limbiness or other major defects

Cunit —
one hundred cubic feet of solid wood (wood and bark)

D.B.H. —
the tree diameter at breast height (one and one-half meter above the ground)

Decay —
the decomposition of wood substance by fungi; the breakdown of wood due to the change in its chemical and physical properties

Defect —
any imperfections in a tree or log that reduces the volume or value of that log

Density, stand —
a measure of the number of trees per unit area. Density is usually expressed as basal area

Dominance —
a superiority in height growth

Ecology —
the science pertaining to the relationship of living things to each other and to their environment

Even-aged stand —
all trees in the stand are the same (or nearly the same) age

Forest —
a collection of forest stands. In a special sense, the forest is considered as a collection of stands administered as an integrated unit

Forest Management —
the practical application of scientific, economic and social principles to the administration of a forest (manipulation) for specified objectives, usually economic

Forest Fire Weather Index—
During the fire season, weather reporting stations in New Brunswick send data twice daily to the Atmospheric Environment Services in Bedford, Nova Scotia. Forecasts are computed and returned to the provincial protection agency.

Forest Extension Service —
a branch of the Department of Natural Resources with the task of encouraging private forest land management

Hardwood —
a deciduous, broadleaved tree

Heartrot —
the decay of the central part of the tree stem or branch

Highgrading —
the harvesting of the largest trees in a forest area which are of highest quality. Consistent use of this policy results in a shortage of timber and depletion of genetic capital

Intermediate trees —
those trees which extend into the forest canopy receiving some sunlight from above but none from the sides, resulting in small crowns at a low level in the forest canopy

Multiple-use —
managing one area of forest land for several uses, including timber production, wildlife conservation and recreation

Natural regeneration —
the natural growth of a forest after an area has been disturbed by cutting, fire, or other natural causes resulting from natural seedfall or sprouting

Natural Resources, Department of —
the government department for management of renewable and non-renewable resources. It covers all aspects of Crown Land and Crown forest management including fish and wildlife and wild land recreation. It is responsible for encouraging private forest land management

Overmature —
the period in its lifecycle when a tree or stand of trees declines in growth and/or value due to the reduced vigor of old age

Pruning —
the natural or artificial removal of dead or live branches from the lower part of the stem of a standing tree

Pulpwood —
wood cut and prepared primarily for manufacture into mechanical or chemical pulp

Reforestation —
the establishment of a stand through planting or seeding

Release —
removing vegetation surrounding a tree to reduce competition for sunlight and nutrients

Rotation —
the time a stand requires to reach peak production; the economic lifespan (not biological lifespan) of a stand

Scarification —
a site preparation method which exposes the mineral soil and/or mixes the humus layer with the underlying mineral soil

Seed orchard —
an 'orchard' planted with seedlings (from seed or rooted branches) which is carefully controlled and cultured for seed production

Selective cutting —
a meaningless term which is often used to cover the act of highgrading

Silviculture —
'Silvi' means forest. Silviculture is the manipulation of the forest under management in order to control the establishment, composition and growth of stands

Site preparation —
any operation done to prepare a site for subsequent reforestation

Site quality —
the productive capacity of a certain area of forest land

Softwood —
the coniferous tree species, for example, pine and spruce

Spacing —
see "thinning"

Sustained yield —
continuous production with the aim of achieving an approximate balance between net growth and harvest

Thinning —
the improvement operation undertaken to reduce competition in a growing stand

Uneven-age stand —
a stand composed of different ages of trees: young, mature, over-mature

Windthrow —
a tree which has been uprooted and felled by the wind